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# Observations on a dermatophilosis outbreak in Brahman cattle in Guadeloupe. Description, epidemiological and economical aspects

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Un foyer de dermatophilose grave est apparue en 1985 dans un troupeau de vaches Brahman importées de la Martinique en Guadeloupe en juillet 1983. La maladie était peu connue en Guadeloupe jusqu'alors, car la race zébu locale possède une résistance naturelle élevée aux maladies transmises par les tiques ou associées à elles. Les conditions de l'apparition et du développement de la maladie ont été étudiées en rapport avec la gestion du troupeau, le climat et les traitements appliqués. Pendant 6 mois suivant l'importation, lorsque les animaux étaient à l'embouche, la maladie ne s'est pas manifestée. Les premières lésions de la dermatophilose sont apparues environ 2 mois après que les animaux ont été mis dans des pâturages infestés de tiques. Alors, 30 p. 100 du troupeau a été infecté. Le développement de l'infection a augmenté de façon dramatique à l'approche de la saison humide, et toutes les 29 vaches Brahman ont montré des lésions en juillet 1985. La maladie n'a pu être guérie que par des traitements draconiens, comprenant des antibiotiques et la désinfection locale, associés au déplacement des animaux des pâturages vers des stalles couvertes. Néanmoins, la maladie a causé la mort de 13 animaux. Des différences dans les réactions individuelles ont été notées et 7 types différents d'évolution ont été identifiés. Ces observations ont fourni des informations sur l'épidémiologie de la dermatophilose dans les conditions climatiques tropicales humides des Caraïbes. Elles ont démontré l'importance économique de cette maladie grave pour les bovins de la région, ainsi que la sensibilité des races exotiques.

**Mots clés :** Bovin Brahman - Dermatophilose - Tique - Conduite du troupeau - Pâturage - Antibiotique - Épidémiologie - Économie de l'élevage - Guadeloupe.

## INTRODUCTION

Dermatophilosis, a bacterial skin disease due to *Dermatophilus congolensis*, is the most important infectious disease of ruminants in the Caribbean (5, 14, 15). Severe outbreaks of the disease are closely associated with the presence of the tropical bont tick *Amblyomma variegatum* (3, 5, 11, 14, 15).

In Guadeloupe, where *Amblyomma* ticks have been present for a long time, cattle breeding is based on the use of a local Creole population issued from various breeds, including African, European and Indian cattle, from taurine and zebu type. This population appears to be highly resistant to the disease (3).

The high susceptibility of Brahman cattle to dermatophilosis is well known (4, 6, 7, 9, 13), whereas several local breeds in Africa have been reported to be resistant (1, 9, 13). Also in Guadeloupe, an introduction in 1983 of a Brahman herd ended in a severe outbreak of dermatophilosis, a disease which had not yet been reported in such a critical way in our conditions. In late 1985, only 45 % of the animals were still alive, after repeated treatments and considerable efforts.

This pathological study was not the main purpose of the herd management, but the sanitary survey of the animals has been registered throughout the evolution of the disease. The present report is based on the interpretation of our observations on frequency of treatments, scabs scoring, mortality, management conditions and economic losses which could be related to the disease.

## MATERIAL AND METHODS

### Herd management

Twenty-nine Brahman yearling heifers were imported from Martinique in July 1983 and reared in covered pens, then in open feed-lot for a year, with a short grazing period in December 1983 and January 1984.

In July 1984, they were allowed to graze, in a single lot during the breeding season until November 1984, and then in two herds, for a comparison of animal production with cows of the local Creole breed. The herds contained : (H1) 20 Brahman and 9 Creole heifers, and (H2) : 9 Brahman and 9 Creole heifers grazing respectively 5.8 and 4 ha of *Digitaria* pasture, intensively managed with irrigation and fertilization. Both pastures were free of thorny bushes; trees offer shade in both of them, but more in (H2) than in (H1).

The first objective, a comparison of animal production, was not completely carried out since dermatophilosis occurred in Brahman cows. Considering its severe impact, Brahman were removed from pastures in August 1985, firstly in a feed-lot, then in individual covered pens. The aim of this transfer was to facilitate surveillance and treatments of affected animals, and their protection against environmental agents such as ticks, sun and rain.

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## Sanitary policy

Cattle on pastures were regularly sprayed against ticks, at least once a month with deltamethrin (Butox®, 0.5 ml/l), mixed with a local disinfectant (Cresyl). This treatment controlled but did not eliminate the ticks from the cattle; they remained present at a low to medium level (5 to 10 adult ticks per head) during the whole grazing period.

After their movement indoors, cattle were dipped in a solution of chlorpyrifos and toxaphene (Procibam®, 1.5 ml/l) and quaternary ammonium (0.1 ml/l), three times in the following month, in order to eliminate the ticks and disinfect the coat of the animals. Then, cows were sprayed with quaternary ammonium (0.5 and 1 ml/l), once or twice a week until November 1985, and less frequently in the following months.

Animals infected with dermatophilosis lesions were treated by intramuscular injections of antibiotics. Different preparations were successively used :

- oxytetracycline (Long Acting Terramycine®, 200 mg/ml), as a single injection (1 ml/10 kg) (LAT) ;

- spiramycine (Suanovil 20®, 0.6 x10<sup>6</sup> IU/ml), as a single injection (12.5 ml/100 kg) (S20) ;

- from May to July 1985, LAT or S20 treatments were replaced because of the high cost of the products (40 ml LAT cost about US \$ 60) and because it was difficult to obtain in Guadeloupe. An association of penicillin and streptomycin was used, as the only formulation then available (BiPeniStreptomycine®, 5x10<sup>6</sup> IU/5 g), dosed 10x10<sup>6</sup> IU/10 g per head, every 10 to 15 days (BPS).

## Interpretations

Each treatment was registered individually for each animal. On several occasions, lesion intensity was also recorded, by visual evaluation according to a four levels scale, as well as body condition and weight.

The description of the disease evolution is based on treatment procedures : frequencies at different periods, intervals between treatments and cumulative number of treatments per animal. Evolution of lesions and body condition have been related to treatments on some occasions.

Individual datas have also been analysed through factorial analysis and hierarchical classification, revealing groups of animals according to their own reactions during the outbreak. The individual data included in the analysis were :

- date of appearance of the first lesions (3 classes) ;
- season of appearance of the lesions (2 classes) ;
- number of treatments (LAT or S20) till April 1985 (3 classes) ;

- first BPS treatment in 1985 (2 classes) ;
- number of BPS treatments (2 classes) ;
- intensity of the lesions in August 1985 (3 classes).

The physical and economical incidence of the disease on the animal production has also been evaluated.

## RESULTS

### Evolution of the disease

The data on the frequency of the treatments express the clinical evolution of the disease. They are summarized in figure 1 for the whole period between the appearance of the first cases and the end of the worst outbreak in late 1985.

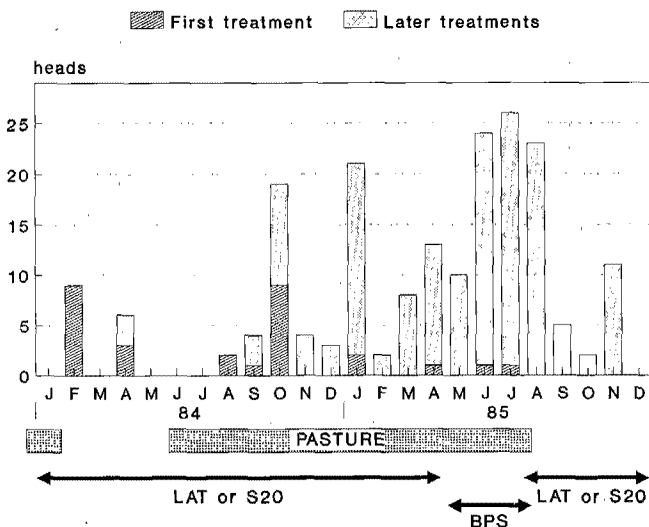


Figure 1 : Evolution of the number of animals threatened per month.

### Appearance of the disease

The first cases of dermatophilosis appeared two months after cattle were allowed to graze, in February 1984 on nine heifers (31 %) and on three more animals in April 1984. They were treated by LAT; for three of them, this treatment was repeated two months later. No more treatments were necessary during the three following months, neither on new cases nor on already treated animals.

Between August and October 1984, twelve new cases were recorded (41 % of the herd). By that same time, treatments had to be renewed on ten animals of the twel-

ve affected during the first months of the year. Thus, in late 1984, twenty-four (83 %) of the Brahman heifers had been affected with dermatophilosis; half of them had to be treated twice or more.

Table I presents the effect of both treatments (LAT or S20) applied in October 1984 on the intensity of the lesions : 61 % of the animals were cured two weeks later, while most of the others had only rare scabs. Both treatments appeared to have the same efficacy, and reduced significantly the body surface covered with lesions.

**TABLE I** *Effect of treatment (October 1984)*

Scab notation / Treatment	LAT	S20
	03 Oct. 1984	
1 (rare scabs)	5	3
2 - 3 (< 50 % body surface)	4	6
	17 Oct. 1984	
0 (no scabs)	6	5
1 - 2 (< 25 % body surface)	3	4

1985. A new phase of treatments was initiated, with LAT or S20 antibiotics and local disinfection with quaternary ammonium. This policy combined with the protection against ticks and sun was effective as shown in table II. While 35 % of the animals were in very bad condition with severe lesions on August 23rd, the scab intensity rapidly decreased in the first week. But the recovery of the most seriously affected animals was much slower, and 7 more animals among them died. For the others, the disease was completely cured in December 1985.

**TABLE II** *Body condition (23 August 1985) and evolution of the lesions intensity in late 1985.*

Scabs notation	Body condition <sup>(1)</sup>		Evolution of the lesions			
	< 3	> = 3	23 Aug.	29 Aug.	15 Sept.	6 Nov.
No scabs				2	5	11
1 (rare scabs)	1	7	8	6	2	3
2 (< 25 % b.s.)	3	3	6	12	8	3
3 or 4 (> 25 % b.s.)	7	2	9	2	2	1

<sup>(1)</sup> Body condition score : < 3 : weak to very weak ; > = 3 : medium to good.

### Evolution of the disease on pasture

Two phases can then be described after November 1984. During the first one until April 1985, some sporadic treatments were necessary each month, but particularly in January and April 1985 (fig. 1). The LAT or S20 treatments were periodically renewed since the beginning of the rainy season in October 1984; most animals were treated every two to four months with some differences between animals : 60 % of the treatments were renewed after two to four months, vs 30 % less than two months and 10 % more than four months later. No evidence of any herd management effect can be observed on the frequency of treatment in this period :  $1.7 \pm 0.9$  (H1) vs.  $2.0 \pm 1.1$  (H2).

The second phase took place from May to July 1985, during the use of BPS treatment every 2 weeks. The frequency of treatments increased rapidly. This evolution seems to be more unfavourable for the herd H1, with 60 % of cows treated since May 1985 and receiving more than 3 applications, than for H2, where all the cows were treated only in July 1985 and received less than 3 treatments. Nevertheless, no animal remained unaffected by the disease in late July 1985.

### Critical stage and recovery

As the disease reached a critical stage, with the death of 6 animals, cows were moved indoors in August

### Individual reaction to dermatophilosis

Though all the animals were submitted to the same conditions, individual differences appeared. These observations were summarized in six parameters characterizing their individual reactions and reflecting their own susceptibility to the disease. A hierarchical classification following a factorial analysis of these parameters segregated seven groups of animals (table III); the issue of each animal was latter correlated to these groups.

The most important difference is in the date of first appearance of the disease (1st treatment). A second distinction between groups is based on the later evolution, on the average of the frequency of LAT or S20 treatments applied before May 1985, and particularly the incidence of BPS treatments (1st treatment and number), and the intensity of lesions in late August 1985.

This classification seems relevant with the existence of different levels of resistance or susceptibility, the main one being to the first infestation (groups 1 and 2; groups 3 to 5 and groups 6 and 7). But some modulations to the extent of the disease can be observed when this barrier is crossed. The mortality of animals is mainly explained by this distinction.

**TABLE III** *Classification of animals according to their reactions*

Groups (heads)	1 (3)	2 (2)	3 (4)	4 (5)	5 (3)	6 (5)	7 (7)
1 <sup>st</sup> treatment	1985		late 1984			early 1984	
Treatment before May 1985	< = 2		< = 3		3	> = 4	
1 <sup>st</sup> BPS treatment (Number)	July (< = 2)	May (> 2)	July (< = 2)		May (> 2)	July (< = 2)	May (> 2)
Lesions notation	0-1	> = 2	0-1	2-3	3-4	0-2	4
Dead animals	1	2	none		2	2	6

## Consequences on animal production and outcome

Figure 2 presents the evolution of body weight of Brahman and Creole cows in 1985. Until May 1985, the body weight gain was quite similar in both breeds, the Brahman weighing 60 kg more than the Creole. Then, the disease had a strong effect on the weight of Brahman cattle, even on those which survived, their weight lowering until October. For the most badly affected, the effect was quite dramatic before they died.

The incidence of the outbreak on the production of the Brahman herd is summarized in table IV (per cow present in January 1985), in comparison with the Creole cows. The mortality of adults due to the disease (45 %) caused a serious loss shown by the stock variation (commercial value of the adults, including body weight gain and mortality). But the weaner production also fell down, mainly by the lower weaning rate. Thus, the economic incidence of

**TABLE IV** *Consequences on animal production and economic results (according to the breed ; per cow present in January 1985).*

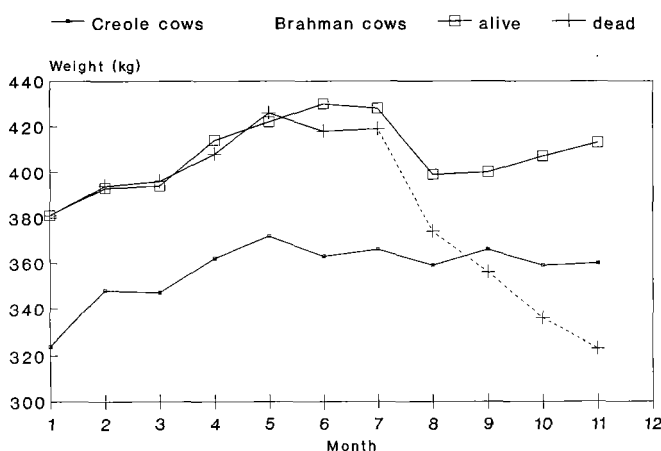
	Brahman	Creole
Body weight (kg) ( 1-85)	380	325
(12-85)	420	365
Mortality (Adults)	0.45	0
Weaned calves (/cow)	0.41	0.89
Weaning weight (kg) (/calf)	155	160
Stock variation (US \$)	- 522	+ 122
Cost of treatments (US \$)	- 200	0
Weaning production (US \$)	+ 222	+ 498
Net out come (US \$)	- 500	+ 620

the disease, including the cost of treatments (referred to the price of antibiotics in 1985), was particularly dramatic, with a loss of US \$ 1120 per head compared to the Creole cows bred in the same conditions, but resistant to dermatophilosis.

## DISCUSSION

It is interesting to notice that the disease appeared in animals, two to three months after they were allowed to graze. This could be related to the presence of ticks on pastures, which is often reported as a major cause for the induction of clinical dermatophilosis (1, 3, 6, 7, 9, 11, 13). Acaricide treatments were however carried out, but at a frequency that did not totally prevent the infestation by ticks.

On the other hand, a climatic effect could also be suspected, as the disease appeared in most of the animals (22 heads, 76 %) during the hot and moist season between

**Figure 2 :** *Body weight evolution in 1985*



August and October 1984, and the outbreak reached its maximum in the same season in 1985. Several authors have already noticed dermatophilosis outbreaks at the start of the rainy season (1, 6, 7, 13). However, the climate in the Caribbean and particularly the constant high humidity is favorable to its development all around the year (11, 14). This can explain its incidence in the dry season, although on a few animals.

Recovery was obtained by the conjunction of several factors, as suggested by previous studies (7, 9), among which the return indoors of the animals, similarly to the effect noticed by OLOGUN *et al.* (12). This management facilitated treatments by parenteral antibiotics and external disinfection, and at the same time, reduced the incidence of the ticks, unable to live in the stable. Furthermore it suppressed the effect of sun and rain, by the disposal of a shelter. The combination of these different policies seems the only way for a sustained cure of the disease in our conditions.

The efficacy of most of the anti-infective treatments applied is in agreement with previous recommendations (2, 4, 8, 10). But the high frequency of treatments with BPS and the inadequate low dosage used had caused a lower activity by the time, already observed by ILEMOBADE (8).

The classification based on epidemiological observations is consistent with the results of immunological responses to *D. congolensis* (1, 9). Differences between individuals may be suspected concerning the role of the skin surface against infection by *D. congolensis*, as well as in the susceptibility of the animals to the extent of the disease; the methodology applied in our study could therefore be used as a tool to exemplify these differences.

The high sensitivity of Brahman cattle to dermatophilosis, already observed by many workers (3, 4, 6, 7, 9, 11, 13), is confirmed in our conditions. Its consequences on animal production, when risks and preventive policies are insufficiently assessed, are in agreement with previous reports (11, 13). In the traditional breeding systems of Guadeloupe, the use of the local breed resistant to diseases is much more justified economically than the use of exotic cattle which are more productive but highly susceptible to diseases.

## CONCLUSION

These observations point out that dermatophilosis may have a great impact on animal production in the Caribbean when susceptible livestock is reared under risk conditions, meaning the presence of *Amblyomma* ticks, even if they are controlled by regular application of acaricides.

On the other hand, the local Creole cattle are of great interest, as they are obviously adapted to breeding conditions in the region. The resistance of this hardy breed to tick-borne diseases is well known, as well as its adaptation to climatic and nutritional constraints. These considerations increased the interest of the authors for the improvement of its genetic value, and selection to improve animal production in the Caribbean.

Finally, more investigations on the genetically determined susceptibility or resistance to diseases transmitted or associated with ticks are needed, as this could be a promising and sustainable way to control them.

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NAVES (M.), VALLÉE (F.), BARRÉ (N.). Observations on a dermatophilosis outbreak in Brahman cattle in Guadeloupe. Description, epidemiological and economical aspects. *Revue Élev. Méd. vét. Pays trop.*, 1993, **46** (1-2) : 297-302

A severe outbreak of dermatophilosis occurred in 1985 in a herd of Brahman cows imported from Martinique in Guadeloupe in July 1983. Little was known on this disease in Guadeloupe until then, for the local zebu breed is naturally highly resistant to diseases transmitted by ticks or associated with them. Conditions of appearance and development of the disease were studied in relation with herd management, climate and treatments applied. There was no evidence of the disease during the first 6 months following the importation, in a feedlot management. The first lesions of dermatophilosis appeared about 2 months after the animals were allowed to graze on pastures infested with ticks. Then, thirty percent of the herd became infected. Development of the infection increased dramatically as the humid season approached, and all the 29 Brahman cows showed lesions in July 1985. Only drastic treatments, including antibiotics and local disinfection, associated with the removal from pastures into covered stables allowed the recovery from the disease. Nevertheless, the disease caused the death of 13 head. Differences in individual reactions were also noted, and 7 different types of evolution were identified. These observations provided informations about the epidemiology of dermatophilosis in the climatic conditions of Caribbean humid tropics. They showed the economic importance of this severe disease for cattle in the region and the sensitivity of exotic breeds.

**Key words** : Brahman cattle - Dermatophilosis - Tick - Livestock management - Grazing - Antibiotics - Epidemiology - Livestock economics - Guadeloupe.

NAVES (M.), VALLÉE (F.), BARRÉ (N.). Observaciones de un brote de dermatofilia en ganado Brahman en Guadalupe. Descripción, epidemiología y aspectos económicos. *Revue Élev. Méd. vét. Pays trop.*, 1993, **46** (1-2) : 297-302

En 1985 se dió un brote severo de dermatofilia en un hato de vacas Brahman, importadas de Martinica a Guadalupe, en julio de 1983. Los datos anteriores de esta enfermedad en Guadalupe son escasos, debido a que la raza cebú local posee una alta resistencia natural a las enfermedades transmitidas por garrapatas o asociadas a éstas. Las condiciones de la aparición y del desarrollo de la enfermedad se estudiaron en relación con el tipo de manejo, el clima y los tratamientos administrados al hato. En condiciones de manejo intensivo, no se encontró evidencia de la enfermedad en los 6 meses siguientes a la importación. Las primeras lesiones de dermatofilia aparecieron al cabo de dos meses, luego que los animales fueron puestos en pastoreo en potreros infestados con garrapatas. Treinta por ciento del hato fue infectado. El desarrollo de la infección aumentó drásticamente durante la estación húmeda, con lesiones evidentes en las 29 vacas Brahman, en julio 1985. La recuperación se observó solamente en los casos en los que se aplicaron tratamientos agresivos, incluyendo antibióticos y desinfección local, junto con traslado de los animales a establos. A pesar de esto, trece de los animales sucumbieron a la infección. Se señalan también diferentes reacciones individuales, así como 7 tipos de evolución. Las observaciones proveen informaciones sobre la epidemiología de la dermatofilia bajo las condiciones climáticas caribeñas del trópico húmedo. Se demuestra la importancia económica de esta grave enfermedad para el ganado de la región, así como la sensibilidad de las razas exóticas.

**Palabras claves** : Bovino Brahman - Dermatofilia - Garrapata - Manejo del ganado - Pastoreo - Antibiótico - Epidemiología - Economía de la cría - Guadalupe.